CLAIMS

1. Apparatus for correcting distortion on an optical transmission link carrying a multiplicity of optical transmission channels, the apparatus comprising:

an adjustable optical equalizer, through which a plurality of said channels pass;

a field sampler that samples signals passing through said equalizer, such that a plurality of channels passing through the adjustable equalizer are separately sampled; and

a controller that receives the samples, determines control parameters for the equalizer therefrom and adjusts the equalizer, responsive to said determined control parameters.

2. Apparatus according to claim 1 wherein the adjustable equalizer comprises a concatenation of a plurality of tunable optical filters.

3. Apparatus according to claim 2 wherein the tunable optical filters comprise a polarization adjuster and a differential delay for orthogonal polarizations.

4. Apparatus according to claim 2 wherein the tunable optical filters comprise a polarization adjuster and a differential phase shifter for orthogonal polarizations.

5. Apparatus according to claim 4 wherein the tunable optical filters also include a differential delay for orthogonal polarizations.

6. Apparatus according to claim 2 wherein the tunable optical filters comprise a beam splitter and a differential delay.

7. Apparatus according to claim 2 wherein the tunable optical filters comprise a beam splitter and a different phase shifter for the split beams.

8. Apparatus according to claim 7 wherein the tunable optical filters also include a differential delay for the split beams.

9. Apparatus according to any of the preceding claims wherein all of the channels received on the transmission link pass through the adjustable equalizer.

10. Apparatus according to any of claims 1-5 wherein the plurality of channels comprises fewer than all of the channels received on the transmission link.

11. Apparatus according to claim 10 and including at least one additional distortion correction apparatus, which is operative to adjust at least some of the other channels received on the transmission link.

12. Apparatus according to claim 11 wherein each additional distortion apparatus comprises:

an adjustable optical equalizer, through which a plurality of said channels pass;

a field sampler that samples signals passing through said equalizer, such that a plurality of channels passing through the adjustable equalizer are separately sampled; and

a controller that receives the samples, determines control parameters for the equalizer therefrom and adjusts the equalizer, responsive to said determined control parameters.

13. Apparatus according to any of claims 10-12 wherein the plurality of channels corrected by at least some of the distortion correction apparatus comprises 4 channels.

14. Apparatus according to any of claims 10-12 wherein the plurality of channels corrected by at least some of the distortion correction apparatus comprises 8 channels.

15. Apparatus according to any of claims 10-12 wherein the plurality of channels corrected by at least some of the distortion correction apparatus comprises 16 channels.

16. Apparatus according to any of the preceding claims wherein the controller determines said control parameters by an iterative method.

17. Apparatus according to any of claims 1-16 wherein the controller determines said control parameters utilizing a neural network method.

18. Apparatus according to claim 16 or claim 17 wherein said method minimizes a cost function.

19. Apparatus according to claim 16 or claim 17. wherein said method maximizes a cost function.

20. Apparatus according to claim 18 or 19 wherein the cost function is derived from signals passed on the individual channels.

21. Apparatus according to any of claims 18-20 wherein the cost function is responsive to a quality of match between an actual pulse shape and an ideal pulse shape.

22. Apparatus according to any of claims 18-21 wherein the cost function is responsive to a quality of match between an actual pulse shape and an undistorted pulse shape.

23. Apparatus according to any of claims 18-22 wherein the cost function is responsive to a peak of pulses in the channels.

24. Apparatus according to any of claims 18-23 wherein the cost function is responsive to a BER in the respective channels.

25. Apparatus according to any of claims 18-24 wherein the cost function is responsive to a Q factor for the respective channels.

26. Apparatus according to any of claims 18-25 wherein the cost function is responsive to an eye opening for the respective channels.

27. Apparatus according to any of claims 20-26 wherein the cost function gives a higher weight to those channels that are further from desired values than to those that are closer to desired values.

28. Apparatus according to any of the preceding claims wherein the controller determines initial control parameters based on measurements on a training sequence of pulses.

29. Apparatus according to any of the claims 1-27 wherein the controller sets initial control parameters to produce minimum changes in all of the channels.

30. Apparatus according to any of claims 1-27 wherein the controller sets initial control parameters based on trial and error.

31. Apparatus according to any of claims 1-27 wherein the controller sets initial control parameters based on known or assumed distortions in the transmission link.

32. Apparatus according to any of the preceding claims wherein the controller updates the control parameters based on periodic sets of training pulses.

33. Apparatus according to any of claims 1-32, wherein the controller updates the control parameters based on actual data transmitted on the transmission link.

34. Dual path filter apparatus for correcting distortion on an optical transmission link carrying a multiplicity of optical transmission channels, the apparatus comprising:

an beam splitter that splits signals received from a transmission system into two paths, each having carrying substantially the same channels;

first correction apparatus that receives the signals from a first one of the paths comprising a first adjustable equalizer, an optical field sampler that samples signals passing through said equalizer and a controller that is operative to adjust the first adjustable equalizer, responsive to the sampled signals to ameliorate the distortion; and

second correction apparatus along the other path comprising a main line adjustable equalizer, substantially the same as the first adjustable equalizer through which a plurality of said channels pass;

wherein said controller adjusts parameters of said main line adjustable equalizer responsive to a desired compensation achieved in said first path.

35. Apparatus according to claim 34 wherein the first correction apparatus is an apparatus in accordance with any of claims 1-33.

36. Apparatus according to claim 34 or claim 35 wherein the second correction apparatus is an apparatus in accordance with any of claims 1-33.

37. Apparatus according to any of claims 34-36 wherein the first and second correction apparatus are substantially of the same construction.